ONAP For Enterprise Business

Catherine Lefèvre, AT&T
Amar Kapadia, Aarna Networks
Byung-Woo Jun, Ericsson
Prabhjot Singh Sethi, Aarna Networks

June 8th, 2021 @4.30pm CET/10.30am EST
ONAP - Enabler For Innovation

Industry Collaboration
5G Footprint
Slicing Capabilities
Security
Cloud Native
Production Readiness

Network Automation
RAN Virtualization
Enterprise/Vertical Markets

June 8, 2021 / LFN Developer Event
5G Open Source Stack Initiative

Cross Communities Effort including E2E SDO/Alliance Integration

Target Audience:
- Enterprise Networking
- Service Providers
- End Users, Governments

ONAP Assets:
- Orchestration & Life Cycle Management
- Cloud Native Modularity
- 5G Network Slicing
- Support ORAN SC SMO
- Control Loop Automation
- Analytics
- And More ...

Learn more: 5G Super Blueprint - Networking (lfnetworking.org)
What is Magma?

Introducing Magma

- Hyper Scalable & Distributed Core
- Highly Available
- Open Source with Permissive Licensing
- Cloud Native, CUPS, Containerized
- Vendor / Transport Agnostic
- Local Break-out for Internet Traffic
- MNO Core Integration
- Remote Configuration & Lifecycle Management using REST APIs
- “All access” Convergence
  - LTE, Wi-Fi, P-LTE, 5G

ACCESS NETWORK

MAGMA CONVERGED CORE

REST APIs

Orchestrator
& NMS

Federation Gateway

LTE
SGW
PGW
AAA
MME
HSS
AGW

Wi-Fi

5G*

UPF
AMF
SMF
AUSF
PCF
UDM

Core Deployment Options

4G LTE / 5G / Wi-Fi/CBRS

MNO CORE

MNO Core

PCRF
HSS
OCS
Wi-Fi

Internet

Cell Site
(OTS H/W)

Private Cloud

Public Cloud

*5G Convergence is on the Roadmap
ONAP/Magma Integration Principles

INITIAL SCOPE
- Orchestration of Magma Controller and GWs
- Magma Controller/GWs configuration
- Magma Controller/GWs LCM (e.g. update)
- Magma Network Slicing

FUTURE CAPABILITIES
- Magma Controller/GWs control loops
- Analytics on Magma Controller data
- AI/ML on Magma Controller data
ONAP/Magma Flows (Day 0/1)

ONAP Magma Deployment Process Sequence (Magma is CNF):

<table>
<thead>
<tr>
<th>#</th>
<th>Actor</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>designer</td>
<td>onboards Magma CNF package to SDC</td>
</tr>
<tr>
<td>2</td>
<td>designer</td>
<td>designs/distribute Magma CBA to CDS</td>
</tr>
<tr>
<td>3</td>
<td>SDC</td>
<td>distributes Magma CSAR to ONAP runtime components such as SO, SDNC, MultiCloud</td>
</tr>
<tr>
<td>4</td>
<td>admin</td>
<td>registers target K8S cloud to K8S plugin and adds tenant</td>
</tr>
<tr>
<td>5</td>
<td>K8S plugin</td>
<td>populates K8S cloud &amp; node info to AAI</td>
</tr>
<tr>
<td>6</td>
<td>operator</td>
<td>starts Magma CNF service creation by calling SO</td>
</tr>
<tr>
<td>7</td>
<td>SO</td>
<td>asks OOF for homing for Magma CNF</td>
</tr>
<tr>
<td>8</td>
<td>SO</td>
<td>assigns Magma CNF to SDNC</td>
</tr>
<tr>
<td>9</td>
<td>SDNC</td>
<td>assigns Magma CNF / generates Magma CNF configuration from template to CDS</td>
</tr>
<tr>
<td>10</td>
<td>CDS</td>
<td>enriches Magma CNF configuration to K8S plugin</td>
</tr>
<tr>
<td>11</td>
<td>SO</td>
<td>calls CNF Adapter to instantiate CNF</td>
</tr>
<tr>
<td>12</td>
<td>cnf adapter</td>
<td>calls K8S plugin Instantiate API</td>
</tr>
<tr>
<td>13</td>
<td>K8S plugin</td>
<td>deploys Magma CNF from helm chart to the target K8S</td>
</tr>
<tr>
<td>14</td>
<td>K8S master</td>
<td>deploys Magma CNF to K8S node</td>
</tr>
<tr>
<td>15</td>
<td>cnf adapter</td>
<td>updates Magma CNF Instance</td>
</tr>
</tbody>
</table>

June 8, 2021 / LFN Developer Event
Steps of processing of Helm data with help of CDS

1. Onboarded Helm package
2. External input for CBA
3. Generated profile contents
4. Helm enrichment/Profile generation input
5. Generated Helm enrichment/Profile contents
6. Final Helm package for instantiation as a merge of override values and additional/modified Helm templates from Profile
7. Preparation of Configuration Template - Helm package with K8S resources for CNF configuration
8. Preparation of configuration overrides of Configuration template
9. Merge of configuration template and parameters and instantiation of configuration

- CDS plays a crucial role in the process of Magma CNF instantiation
- During a helm package is instantiated, K8S Plugin combines override values from helm package, rb profile and from the instantiation request
- Magma Helm package and CBA can follow the same ONAP procedures as illustrated here for Day 0/1/2 operation
1. Certificates, Keys and Config files made available as part of Day (0/1) configuration
2. AGW is added to the AAI with information on Hardware-ID and Challenge Key
3. CBA content
4. Config assign
5. Config deploy
6. Merge of config template and parameters forming AGW registration instance
7. Configure Magma Controller using the Rest Interface
8. Access Gateway Check-in into Magma Controller and initiates bootstrap process.

Connection between Magma Controller and AGW establishes
Magma Sample Configuration

```json
{
    "cellular": {
        "epc": {
            "default_rule_id": "default_rule_1",
            "gx_qx Relay_enabled": false,
            "hss Relay_enabled": false,
            "lte auth_amf": "gAA-",
            "lte auth_op": "EEREREREREREREREREQ---",
            "mcc": "001",
            "mnc": "01",
            "network_services": ["policy enforcement"
            ],
            "tac": 1
        },
        "ran": {
            "bandwidth_mhz": 20,
            "tdd_config": {
                "earfcndl": 44590,
                "special_subframe_pattern": 7,
                "subframe_assignment": 2
            }
        }
    },
    "description": "sample desc",
    "dns": {
        "enable caching": false,
        "local_ttl": 60
    },
    "id": "network 1",
    "name": "sample"
}
```
ONAP/Magma Integration

Magma Controller (orc8R) NBI swagger:
https://app.swaggerhub.com/apis/karthiksubraveti/magma/1.0.0#/Gateways/post_networks_network_id_gateways

Supported API Operation
- Alerts
- Call Tracing
- Carrier Wifi gateways
- Carrier Wifi Networks
- EnodeBs
- Federated LTE Networks
- Federation Gateways
- Federation Networks
- Gateways
- LTE Gateways
- LTE Networks
- Metrics
- Policies
- Rating Groups
- SMS

Supported API Operation
- Tenants
- Upgrades
- Wifi Gateways
- Wifi Meshes
- Wifi Networks
- baremetal
- e2e
- Events
- Defaults
- APNs
- Subscribers
- Network Probes
- Commands
- Logs
- Models

ONAP sees Magma as EMS/Controller that manages wireless network (5G, 4G)
- When Magma Controller is used, thru K8S plugin, SDNC/CDS delegate its operations to the Magma Controller
- Magma CNF model/package e2e distribution will be done thru ONAP. Currently Magma self-contains all the necessary models / packages
- Magma metrics will be collected by DCAE

Magma has three major components
- Orchestrator
  - Provides configurations and monitoring of wireless network
  - Its web UI provides analytics and traffic flows
- Access Gateway
  - Provides network services and policy enforcement
  - Implements CNFs/VNFs/PNFs
- Federation Gateway
  - Integrates MNO core network by 3GPP interfaces
  - Acts as a proxy between AGW and operator’s network (authentication, data plans, policy enforcement, charging)
Q&A

Interested to join us?

**Bi-Weekly Meeting** - **Wednesday @7.30am PST/10.30 am EST/4.30pm CET**

ONAP Wiki: [TSC Task Force: ONAP for Enterprise Business](#)

Mailing List: [onap-enterprise@lists.onap.org](mailto:onap-enterprise@lists.onap.org)